Hardware Reference Guide For The
7535

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ISO 9001 Certified
Quality Management System

PSION TEKLOGIX

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1.1 About This Manual

This manual provides development information specific to the Psion Teklogix 7535. General information about developing with the Psion Teklogix SDK For Mobile Devices is given in the Developers' Guide. Specific information about function calls, methods, etc, is given in the online API Reference Guide.

Chapter 1: Introduction
provides an overview of this manual, 7535 applications, including the PC connectivity software, ActiveSync, and care of the 7535.

Chapter 2: The Hardware
describes the 7535's hardware.

Chapter 3: The Software
describes the 7535's software.

Chapter 4: Connecting
describes how to connect to the 7535.

Chapter 5: Reinstalling The OS
provides instructions on reinstalling the 7535's operating system.

Appendix A: Support Services And Worldwide Offices
presents information for technical support, contacts and the Psion Teklogix worldwide web address.

1.2 Text Conventions

Note: *Notes highlight additional helpful information.*

Important: ***These statements provide particularly important instructions or additional information that is critical to the operation of the computer and other equipment.***

Warning: ***These statements provide important information that may prevent injury, damage to the equipment, or loss of data.***

1.3 About The 7535 Hand-Held Computer

The 7535 is a ruggedized hand-held personal computer, running the Microsoft® Windows® CE.NET 4.2 operating system. It is intended for use in commercial and light industrial applications with a focus on real time wireless data transactions. All possible bar code input methodologies are supported by one of the variety of scanners available. Optimization for specific operational environments is supported with a wide range of peripheral options and carrying accessories.

The 7535 uses a custom build of Windows CE 4.2 operating system, running on the Intel X-Scale PXA255 processor. It can accept executables written for this processor or the ARM v4 processor, or (with the appropriate runtime engines).NET CIL executables or Java bytecode executables.

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2.1 The Hardware

Figure 2.1 The 7535

2.1.1 Processor

The 7535 is built around a 400-MHz Intel PXA255 processor. This ARM-core-based CPU is also known as XScale™, and is the successor to the StrongArm SA1110. This processor has many integrated peripherals, such as UARTs, PCMCIA/CF, and LCD controllers.

2.1.2 Onboard Memory

The 7535 has 32 megabytes of flash memory and 64 megabytes of RAM.

2.1.3 Hardware Architecture

A smaller, low-power microcontroller, the “peripheral controller”, is used to control and monitor many aspects of the hardware, including controlling system power, communicating with the smart battery pack, handling communications with the keyboard controller, collecting raw non-decoded scanner input, monitoring temperature, light, and other sensors.

There are also two PIC microcontrollers; one scans the matrix keyboard and controls the LEDs, and the other drives the keyboard backlight.

2.2 Identifying Hardware

The 7535's hardware configuration is listed in the information provided by the System Properties applet in the Control Panel.

To reach this manually:

1. Press **Blue** + **0** to open the start menu.
2. Select **Settings, Control Panel**. The *Control Panel* opens.
3. Double-click on the **System** icon. The *System Properties* window opens.
4. Click on the **Properties** tab. *System Properties* lists the hardware and software in the 7535.

Listed items include:

- Date codes for the 7535's boot software ('Boot code'), peripheral-controller code ('PCon code') and OS software ('WinCE code').
- Processor type and speed.
- Amount of RAM and flash memory.
- Type and orientation of display.
- Presence and type of touch screen.
- Presence and type of scanner.
- Type of keyboard.
- Presence of heater.
- Serial number of main logic board ('MLB Serial').
- Serial number of device.
- Presence and type of card in internal PCMCIA and Compact Flash slots ('PCM/CF Slots-').

2.3 The Scanner

The 7535 can support the following scanners, internal or external:

- 1D scanner
- PDF 417 2D scanner
- image scanner

Only one scanner is installed in the 7535, but a second handheld scanner can be connected via the tether port.

Internal scanners can be triggered from the trigger switch on the 7535's handgrip (if present) or from the Scan button on the 7535's keyboard. External scanners can only be triggered from their own trigger switch.

2.3.1 Scanner Control Services

This top level service (SCS) is responsible for supporting a variety of Physical Scan Drivers (PSD), and presenting an API to applications. It receives decoded scan data from the drivers, performs any configured translations, and delivers the data to the appropriate application(s).

2.3.2 Non-decoded Laser Scanners

These scanners present raw data to the terminal. Internal and external non-decoded laser scanners are controlled by the main processor. Activation of the scanner trigger(s) or the keyboard scan button(s) causes the main processor to initiate a scan with the appropriate scanner. The peripheral controller acquires the raw scanner data and feeds it to the main processor.

The non-decoded scan driver is responsible for receiving this data from the peripheral controller and decoding it before passing it to the Scan Control Service, which performs any configured translations and delivers the data to the appropriate application(s).

2.3.3 Decoded Laser Scanners

These scanners process their raw data themselves, presenting formatted data to the terminal. Both 1D and 2D decoded laser scanners are supported by the 7535. The scanners will be connected to one of the serial ports and controlled by the main pro-

cessor. Activation of the scanner trigger(s) or the keyboard scan button(s) will initiate a scan with the appropriate scanner. The decoded scan driver is responsible for receiving scan data and passing it to the Scan Control Service.

2.3.4 Imaging Scanners

The 7535 can support an imaging scanner; both internal and external imaging scanners are supported. Psion Teklogix provides a driver for this scanner.

2.4 The Display

The 7535 is available with a 240x320-pixel display, either monochrome (64 shades of grey) or colour (256k colours). The contrast of the display can be adjusted from the keyboard via hot-keys, and is automatically temperature-compensated.

2.4.1 Touch Input

Touch input is an option for the 7535's display. The touch driver controls the hardware directly to receive touch-down, touch-up, and movement events. Touch events are passed to the application via the operating system.

2.4.2 The Display Backlight

The 7535 has a backlight behind its display. This backlight can be adjusted for intensity, and can be configured to turn on when the ambient light level drops below a configured value.

2.5 The Keyboard

The 7535 has two types of available keyboard layouts. One type has 58 keys; the other has 36 keys.

Windows CE .NET returns 'virtual key codes' for keypresses. Psion Teklogix' keyboard drivers take into account when Psion Teklogix' own special modifier keys (such as the Blue or Orange key) are pressed; the keyboard driver provides the virtual key code of the modified key.

2.5.1 The Keyboard Backlight

The 7535 has a backlight behind its keyboard. This backlight can only be turned off and on, not adjusted for brightness, but it can be configured to turn on when the ambient light level drops below a configured value.

2.6 The LEDs

The 7535 has four tri-coloured indicator LEDs.

Figure 2.2 Indicator LEDs

2.6.1 Charge LED

The lower-right LED is reserved for internal charger/power status. This indicator is active even when the 7535 is inserted in a docking station (and in suspend mode) so that the charge status of the battery can be detected easily.

Function	Charge LED Behaviour
External power not available.	LED off.
Fully charged to within 95% of charge capacity.	LED displays solid green colour.
Quick charge successfully completed to within 75% of charge capacity.	LED flashes slow green.
Charge in progress.	LED displays solid yellow colour.
Cell temperature out of range for charge.	LED flashes yellow.
Unable to charge battery.	LED displays solid red colour.
Charge circuit failure.	LED flashes fast red.

Table 2.1 Charge LEDs

2.6.2 Radio Traffic LED

The upper-left LED on the 7535 flashes either orange or green to indicate when the radio transmits and receives data.

Note: *While the standard 802.11b radio available for the 7535 supports the transmit/receive LED, not all radios support this function.*

Function	Radio Traffic LED Behaviour
Radio Transmit	LED flashes orange.
Radio Receive	LED flashes green.

Table 2.2 Transmit and Receive LEDs

2.6.3 Scan LED

Successful scans are indicated in two ways – with a scan LED and with an audio tone.

Function	Scan LED Behaviour
Scan in progress	LED displays solid red during scan.
Successful scan	LED displays solid green after decode. Off when scan ended.
Unsuccessful scan	LED flashes red.

Table 2.3 Scan LED

2.6.4 User Application LED

This indicator is available for custom applications. Neither the 7535's operating system nor Psion Teklogix' terminal-emulator TekTerm use this LED.

2.7 The Beeper

The 7535 has an internal beeper whose volume can be manually adjusted via keyboard hot-keys.

2.8 Accessory Cards

The 7535 can accept accessory cards, which fit into internal slots in the unit. The 7535 has two slots which accept the following types of accessory cards:

- Compact Flash (CF) cards.
- MultiMedia Cards (MMCs).
- Secure Digital (SD) cards.

These cards can contain additional memory, or other accessories. The Compact Flash slot is normally occupied by a radio.

Typically, 7535 hand-helds are configured at the factory and arrive ready for use. The 7535's accessory-card slots are not intended for user modification.

If a device needs to be changed or added in these slots, contact qualified Psion Teklogix personnel. Refer to Appendix A: Support Services And Worldwide Offices for the service number closest to you.

2.9 Ports

The 7535 itself has the following connectors:

- Docking port.
  Connects to chargers and docking modules.
- Tether port.
  Connects scanners and other cabled peripherals.

2.9.1 The Docking Port

The docking port allows the terminal to be placed in a cradle that allows battery charging and connection to peripherals.

Available peripherals include chargers and a Portable Docking Module (PDM) that provides connections for USB host port, USB client port, and a serial port. See "The Portable Docking Module" on page 17 for details about the PDM.

Figure 2.3 The Docking Port

The docking port supplies DC power, a serial port, a USB host port, and a USB client port.

Power

Power for charging the batteries and powering the terminal (9-24 V DC; 3.4 A max) is supplied to the terminal through the docking port.

The terminal can supply 5V power (2 A max) to an external device through the 'Power Output' pins. This power is switched; the switch is controlled by the Docking Port Services driver and is turned on only after the device is attached and a valid Dock ID is detected.

Console Port

The console port uses a standard 3 wire serial interface (TxD, RxD, GND). Signals levels are standard RS232 levels. This port is provided as a 9-pin D-connector on the Portable Docking Module.

This console port is multiplexed between the main processor (the default) and the peripheral controller. This console port is COM3 under Windows CE .NET.

USB Host Port

The USB host interface complies with USB specification 1.1 and provides a "high-speed" connection to external devices and hubs. Power for external devices is provided through the docking port's power output pins. The OHCI driver is in charge of the USB Host interface.

USB Client Port

The docking port provides a USB client interface to connect the 7535 to a USB host computer or hub. The 7535 acts as a USB serial device via the USB client port. On the 7535, this serial device is COM4. The 7535 also can act as a USB client (a Mass Storage Device), when its bootloader is running, to allow software updates via USB.

Dock ID

By reading a resistance value, the 7535 can identify the device attached to the docking port. The Docking Services driver reads the ID, identifying the device, checks the registry to see which driver to load, then loads the appropriate driver.

2.9.2 The Tether Port

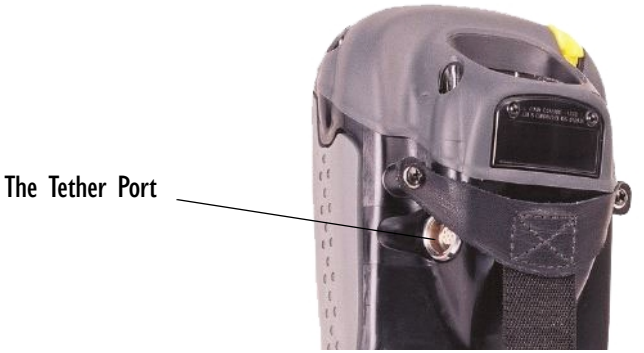


Figure 2.4 The Tether Port

The tether port allows an external non-decoded scanner, a serial scanner, or a USB client device to be connected to the terminal through a single connector. Generic serial devices, such as printers, GPS receivers, and other serial devices, are also supported.

The tether port is COM1.

The 7535's peripheral controller identifies connected devices by sensing a resistor within the cable of the connected device. It notifies a driver running on the main processor that a device has been connected. This driver then looks for an appropriate driver to load, and instructs the peripheral controller to configure the port appropriately and enable power to the port.

See “Section 2.14.2 The Tether Port” on page 19 for details of the devices that can connect to the tether port.

2.9.3 COM Ports On The 7535

The 7535 has the following COM ports:

COM Port	Use
COM1	Tether port
COM2	Reserved (internal use only)
COM3	Console port
COM4	USB port

2.10 Power Management

The 7535 is powered by a lithium-ion rechargeable battery pack. The 7535 can be powered from external power when used with the AC adaptor. When the 7535 is powered from the AC adaptor, it will also charge the battery pack.

An internal supercapacitor will hold charge for ten minutes to preserve the contents of RAM while the 7535’s battery is being changed.

2.11 Turning The 7535 On And Off

To switch on:
press and hold the **Enter**/**On** key for at least one second.

To switch off:
press the **Blue** key, then press the **Enter/On** key. The 7535 enters a suspended state. The contents of RAM are preserved.

2.12 Resetting The 7535

The 7535 hardware can be reset in two different ways. The first way restarts the operating system. The second way does not load the operating system, but presents the boot loader. The boot loader can load the operating system. It has a text-mode console at which commands can be entered.

To reset the 7535 and restart the operating system:

- Press and hold down the **Blue** key and the **Enter/On** key simultaneously for a minimum of six seconds. The four indicator LEDs light for a second, and the screen displays the Psion Teklogix and Microsoft® Windows® CE.net splash screen before displaying the startup desktop.

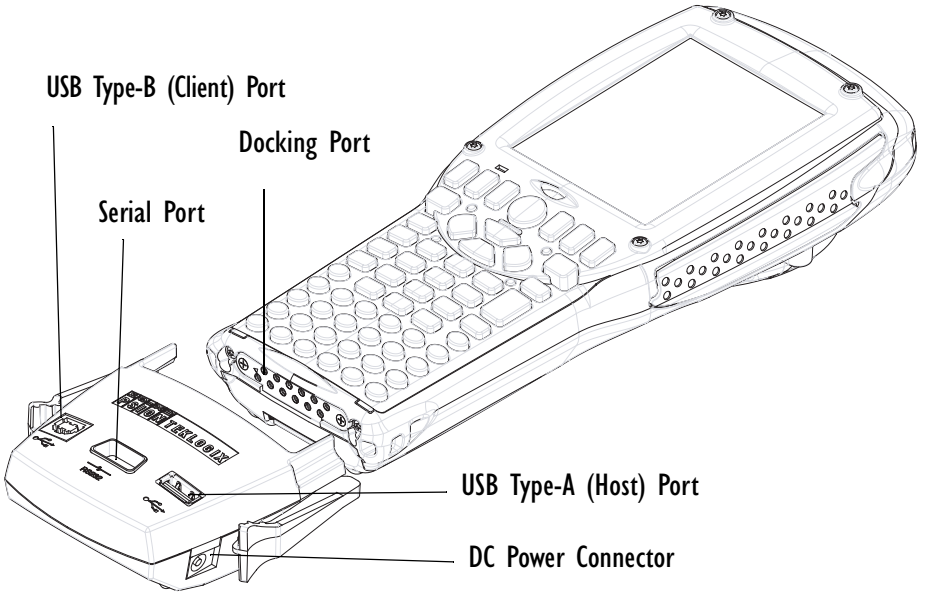
To reset the 7535 and display the boot loader:

- Press and hold down the **Scan** key, the **Blue** key and the **Enter/On** key simultaneously for a minimum of six seconds. The four indicator LEDs light for a second, and the 7535 displays the boot-loader's opening screen.

A reset results in a complete reboot of the unit. All RAM memory contents are lost. The contents of the flash memory and memory card are preserved.

2.13 The Portable Docking Module

The 7535 can be connected to a Portable Docking Module (PDM):



The Portable Docking Module provides serial and USB ports.

The PDM has the following ports:

- Serial port.
  This 9-pin D-connector accepts a null-modem serial cable to connect to the development machine.
- USB type B port.
  This port accepts a cable from a USB host (typically the development computer). It can be used for OS image updates, ActiveSync connections and application debugging.
- USB type A port.
  This port connects the 7535 to other devices; the 7535 serves as a USB host. This port can be used to connect a USB mouse and keyboard.
- Docking port.
  This port connects to the 7535.
- DC power connector.
  Accepts 15 V DC from the AC adaptor.

The Portable Docking Module is available as part of a kit from Psion Teklogix. This kit, Psion Teklogix part number 1030085, includes the following items:

- The Portable Docking Module (part number 1030083)
- A USB A-B cable (part number 9003322)
- A null modem cable (part number 9003659)
- A DC power adapter (part number 9003323)
- A power cord.
  North American power cord: part number A2032 0036 0001

2.14 Pinouts And Cables

2.14.1 The Serial Port

The RS232 serial port on the 7535's Portable Docking Module has the standard 9-pin pinout; however, the PDM only passes the TxD, RxD, and Ground signals to the 7535's docking connector. There is no hardware flow control.

The serial cable supplied is a 9-pin-to-9-pin null-modem cable, Psion Teklogix part number 9003659.

The pinout of a standard 9-pin RS-232 connector is as follows:

Pin	Function
1	DCD
2	RXD
3	TXD
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

Table 2.4 RS232 Pinout

2.14.2 The Tether Port

The 7535 can recognize several types of devices connected to its tether port. These devices are as follows:

- USB device.
- serially-connected RFID reader.
- generic serial device.
- non-decoded scanner.
- decoded serial scanner.

- Psion Teklogix ScanSee, a scanner and input device which can be worn on the back of the hand.

The tether port on the 7535 accepts an eight-pin custom connector:

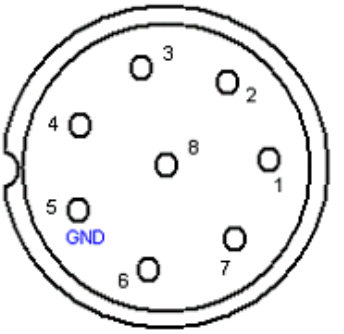


Figure 2.5 Tether Port Connector

A mating connector is available from Psion Teklogix with part number 1020060.

The 7535 distinguishes between devices connected to the tether port by reading the resistance between pin 8 and pin 5 of the tether port. These resistance values are as follows:

Tether ID	Resistor Value (Ohm)	Connected Device
1	150k	USB
2	59k	
3	34.8k	Serially-connected RFID device
4	23.2k	
5	16.2k	Generic serial device
6	11.8k	
7	8.66k	Non-decoded scanner
8	6.34k	
9	4.53k	Decoded serial scanner
10	3.01k	
11	1.82k	Psion Teklogix ScanSee
12	825	

Table 2.5 Recognized Tether Port Resistance Values

Devices that connect to the tether port may be wired as follows:

USB Device

Tether Connector Pin	Pin Description
1	
2	VCC (+5 V from 7535)
3	USB+
4	USB-
5	GND
6	
7	
8	150k Ohm Resistor (Connect the other end of resistor to pin 5)

Table 2.6 Tether Connector Pinout For USB Device

PowerScan Non-decoded Scanner

Tether Connector Pin	Description
1	SCN_TRIG (TRIGGER)
2	VCC (+5 V from 7535)
3	SOS (SOS)
4	SCN_DATA (BAR_OUT)
5	GND (GND and CONFIG2)
6	SCAN_ENABLE (PWR_ENABLE)
7	SCN_ACK (GOOD READ)
8	8.66k Ohm Resistor (Connect the other end of resistor to pin 5)

Table 2.7 Tether Connector Pinout For PowerScan Non-decoded Scanner

Symbol P300STD Non-decoded Scanner

Tether Connector Pin	Description
1	SCN_TRIG (TRIGGER)
2	VCC (+5V from 7535)
3	SOS (SOS)
4	SCN_DATA (DEP)
5	GND (GND)
6	SCAN_ENABLE (ENABLE)
7	SCN_ACK (DECODE)
8	8.66k Ohm Resistor (Connect the other end of resistor to pin 5)

Table 2.8 Tether Connector Pinout For Symbol P300STD Non-decoded Scanner

PowerScan Decoded Scanner

Tether Connector Pin	Description
1	RXD (to 7535)
2	VCC (+5 V from 7535)
3	
4	TXD (from 7535)
5	GND
6	
7	
8	4.53k Ohm Resistor (connect the other end of resistor to pin 5)

Table 2.9 Tether Connector Pinout For PowerScan Decoded Scanner

Symbol P304PRO Decoded Scanner

Tether Connector Pin	Description
1	RXD (to 7535)
2	VCC (+5 V from 7535)
3	
4	TXD (from 7535)
5	GND
6	
7	
8	4.53k Ohm Resistor (connect the other end of resistor to pin 5)

Table 2.10 Tether Connector Pinout For Symbol P304PRO Decoded Scanner

Generic Serial Device

Tether Connector Pin	Pin Description
1	RXD (to 7535)
2	
3	CTS (to 7535)
4	TXD (from 7535)
5	GND
6	
7	RTS (from 7535)
8	16.2k Ohm Resistor (Connect the other end of resistor to pin 5)

Table 2.11 Tether Connector Pinout For Generic Serial Device

ScanSee

Tether Connector Pin	Pin Description	Pin On ScanSee
1	RXD (to 7535)	W4
2	VCC (+5V from 7535)	W2
3		
4	TXD (from 7535)	W3
5	GND	W1
6		
7		
8	1.82k Ohm Resistor (Connect the other end of resistor to pin 5)	

Table 2.12 Tether Connector Pinout For ScanSee

2.14.3 The Docking Port

The docking port on the 7535 can connect to the following devices:

- Portable Docking Module
- Powered Cradle
- Port Replicator
- Combo Charger And Dock
- Quad Dock

The docking port has the following pinout:.

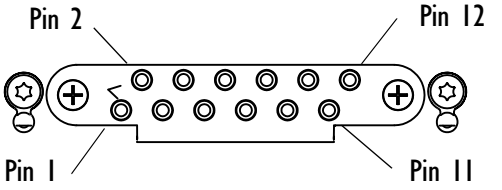


Figure 2.6 Docking Port Connector

Pin Number	Purpose	Notes
1	EXT_5V	Switched 5V DC from 7535 (2 A max)
2	RXD	RS232 RxD (7535 console port)
3	TXD	RS232 TxD (7535 console port)
4	PWR_IN	DC input to 7535 (9-20 V DC; 3.4 A max)
5	USB Host -	USB host data - (to USB peripherals)
6	USB Host +	USB host data + (to USB peripherals)
7	PWR_IN	DC input to 7535 (9-20 V DC; 3.4 A max)
8	DOCK_ID	The resistance between this pin and ground identifies the device to which the terminal is connected.
9	GROUND	
10	USB_D-	USB Client Data - (from USB host)
11	USB_D+	USB Client Data + (from USB host)
12	GROUND	

Table 2.13 Docking Port Pinout

The 7535 distinguishes between devices on the docking port by reading the resistance between pin 8 and ground on the docking port. These resistance values are as follows:

Dock ID	Resistor Value (Ohm)	Connected Device
1	150k	
2	59k	
3	34.8k	Powered Cradle
4	23.2k	
5	16.2k	PDM
6	11.8k	
7	8.66k	Port Replicator
8	6.34k	
9	4.53k	Combo charger/dock
10	3.01k	
11	1.82k	Quad dock
12	825	

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3.1 Overview Of The 7535's Software

This chapter describes features of the boot process and operating-system software that are specific to the 7535.

The 7535 uses a custom build of Microsoft's Windows CE.NET 4.2, with OS-native device drivers for its custom hardware. It can accept executables written for the Intel X-Scale PXA255 processor, or (with the appropriate runtime engine) .NET CIL executables or Java bytecode executables.

The Psion Teklogix-developed 'BooSt' bootloader and mini-OS is used to perform initial hardware configuration and load system software.

The system software design supports the services required by applications. The operating system environment and standard development tools provide the standard services; an application may interface with Psion Teklogix' custom hardware and software interfaces via the Psion Teklogix Mobile Devices SDK.

3.2 The Boot Process

3.2.1 Overview

The 7535 handheld terminal has both a main processor and a peripheral controller.

When the terminal is booted, the peripheral controller boots into BooSt, then runs its own software. This software is stored in the peripheral controller's onboard flash memory.

The main processor uses BooSt as a bootloader and Windows CE .NET 4.2 as the primary operating system.

The image for the main processor's software, including BooSt and Windows CE .NET, are stored in the terminal's flash memory. The main processor cannot boot directly from the flash; a more complex boot process is required. The peripheral controller loads a small amount of code into the main processor's instruction cache, enabling it to start its own boot loader.

3.2.2 Boot Types

The boot process is the series of steps between pressing the on key on the 7535 to when the main operating system is ready for user input. There are three possible times that this may happen:

- the first time the terminal is turned on at the factory (‘initial software load’)
- the terminal is turned on after it is powered down (‘cold boot’)
- the terminal is turned on after it was suspended (‘resume from suspend’).

The most common type of boot is the resume from suspend. When the 7535 is turned off, it enters a ‘suspended’ state, where its main processor is stopped, but retains the contents of its RAM.

Cold boot only occurs if the terminal is intentionally rebooted or if both the main battery and the backup super-capacitor become fully discharged.

The first-time software load, as the name suggests, only happens once, at the factory, and is not discussed further here.

On a cold boot or resume from suspend, the peripheral controller boots using the bootloader image in its flash.

Note: *The following descriptions assume no errors during the boot process.*

3.2.2.1 Cold Boot

During a cold boot, the peripheral controller is the first device powered up. It performs the following steps:

1. Boots the bootloader image located in its own flash.
2. Turns on an LED to confirm the button press by the user.
3. Powers up the main processor but leaves it in reset.
4. Initializes the main processor.
5. Continues running its own software.

Once out of reset, the main processor performs the following tasks:

6. Initializes the 7535’s SDRAM and flash memory.
7. Loads its copy of the bootloader from the NAND flash into RAM.
8. Communicates back to the peripheral controller that everything is okay.
9. Jumps to the bootloader.

The bootloader performs minimal initialization and waits until it gets a 'Go' message back from the peripheral controller, after which it:

10. Fully initializes itself.
11. Writes a message on the terminal screen and the console port.
12. Loads the OS image into RAM.
13. Runs the OS image.

While the Windows CE image is being loaded into RAM, a splash screen is displayed on the terminal's display.

A cold boot can also be triggered by selecting **Blue** + **0** to get the start menu, then selecting **Shut Down**, **Cold Reset**.

3.2.2.2 Warm Boot

The warm boot is a complete cycle transition from Run to Suspend to Run. When transitioning from Run to Suspend, all applications are closed, but working RAM is not cleared and the file system is preserved. A warm boot resumes with working RAM and a file system, whose contents have been preserved from a previous session.

A warm boot can be triggered by selecting **Blue** + **0** to get the start menu, then selecting **Shut Down**, **Warm Reset**.

3.2.3 Other Power Transitions

3.2.3.1 Suspend

A transition to the Suspend state (stopping the microprocessor) occurs when:

- There is a timeout of the user-input inactivity timer, or
- External power is removed, and the battery is low.

Suspend is the usual state of the terminal when it is 'turned off'. It can be triggered by the user in two ways:

- by pressing **Blue** + **0** to get the start menu, then selecting **Shut Down**, **Suspend**.

- by pressing the OFF key-combination **Blue** + **Enter**.

If the unit is running on battery power, and the remaining battery power drops to critical levels as reported by the battery pack, the system will transition gracefully to the Suspend state, and no data will be lost.

If the unit is running on external power without a battery installed, and external power is removed, the system will make a 'non-graceful' transition to the Suspend state. The object store is preserved, the file system in flash is intact, but registry changes that have not been stored in the registry files in flash are lost, running applications are lost, unsaved data is lost. Restart from this state is a cold boot.

3.2.3.2 Resume

During a Resume transition from the Suspend state, the boot process starts in the same way as a cold boot. When going into Suspend, the main operating system writes a value into the Power Management Scratch Pad register. This value can be "run the main operating system on resume" or "run the boot loader on resume".

When a value is read from this register on resume that corresponds to the value for "run the main operating system on resume", the bootloader jumps to the OS image in RAM, and the boot continues. If the value read corresponds to the value "run the boot loader on resume", the bootloader continues to run, giving the user a command prompt.

The user can go to the bootloader's command prompt manually by:

- pressing and holding the **Scan**, **Blue**, and **Enter** keys simultaneously for 6 seconds
- selecting **Blue** + **0** to get the start menu, then selecting **Shut Down**, **Bootloader**.

3.2.4 User Interface

During the boot process, indicators let the user know what is happening:

- When the user presses the ON button, the four LEDs turn on momentarily to confirm the button press.
- When the bootloader is loaded and running on the main processor, a message is displayed on the terminal's screen and on the console port.

- When the main operating system is loaded and run, a splash screen is displayed on the terminal's screen.
- At the end of the boot process, the 7535's shell is displayed on the screen.

Status messages are written to the 7535's serial console ports during the boot process. The peripheral controller and the main processor console ports are multiplexed on the same physical port. They use different command prompts to let the user know which processor is displaying the status message.

The peripheral controller can display the following messages on the console port:

- `Starting BooSt`
- `No image in the NAND flash`
- `No/Invalid image on CF card`
- `PXA250 jumping to BooSt`

The main processor (the PXA250) can display the following messages on the console port:

- `Starting BooSt`
- `Recovering from sleep`
- `PXA250 jumping to Windows CE`
- `Going to BooSt prompt`
- `Valid image in flash date code = <date code>`
- `Invalid image in flash`
- `Valid image on CF card date code = <date code>`
- `Invalid image on CF card`

The user has also been given the ability to adjust when certain transition times are affected. This is done using the Power Properties applet in the Windows Control Panel. One of two power schemes, 'AC Power' or 'Battery Power' can be chosen. The following options can be changed by the user:

- **Switch To Suspend**
  This is the amount of time the unit is idle before the unit executes the Run-to-Suspend transition. This setting is on the *Schemes* tab of the *Power Properties* dialog. Possible settings are: Never, 1, 2, 3, 4, 5, 10, and 30 minutes.

- **Suspend Threshold**
  This is the percentage of battery charge left when the unit executes the Run-to-Suspend transition. This setting is on the *Suspend Threshold* tab of the *Power Properties* dialog. Possible settings are: 0 to 50 percent, in 5% steps.

3.3 The Shell

3.3.1 Overview

The shell is responsible for providing an interface to the user for access to the terminal's applications, files, and configuration. It also monitors and provides notifications to the user about the system state.

3.3.2 System Structure

The shell is the first user application run by the system. It registers several windows with the operating system and has several responsibilities defined by the OS. These responsibilities include monitoring system memory and power levels. Along with the tasks that are required by the OS, the shell is responsible for providing the user with usability features. These features include a notification area, a window that displays currently running tasks and a method to run applications.

The shell is a multithreaded application. Information is passed between the threads using Windows CE graphical window and event system (GWES) and shell-defined message types. Certain parts of the shell must register with the OS to receive special messages.

3.3.2.1 The System Monitor

The system monitor task contains one window to receive messages and can potentially be multithreaded. Each thread can be used to monitor a system resource. The initial design has only one thread that monitors system memory and power. This thread is woken up periodically and checks the system resources.

Memory Monitoring

When the free memory drops below a configurable limit, the shell sends a 'hibernate' message to the last used application window. Application windows are supposed to reduce their memory consumption when they receive this message. If the free memory situation has not improved, the system monitor will send hibernate messages to the other windows.

Power Monitoring

The power monitor provides two different means of feedback to the user.

The first method of feedback is a battery-gauge icon in the system tray. This icon, which resembles a battery, shows the level of charge left in the main battery.

When the battery is fully charged the icon is completely green, when the battery is completely discharged, the battery is red. The other levels in between vary in the amount of green and red in the battery icon (for example, at 60% charge level the battery is 3/5 green and 2/5 red). The shades of red and green will be chosen so that they display as light and dark on a monochrome display.

The battery-gauge icon is replaced with a icon displaying a power connector when the terminal is connected to external power and is not charging. It is replaced with an icon displaying a battery with a lighting bolt when the terminal is connected to external power and the battery is being charged.

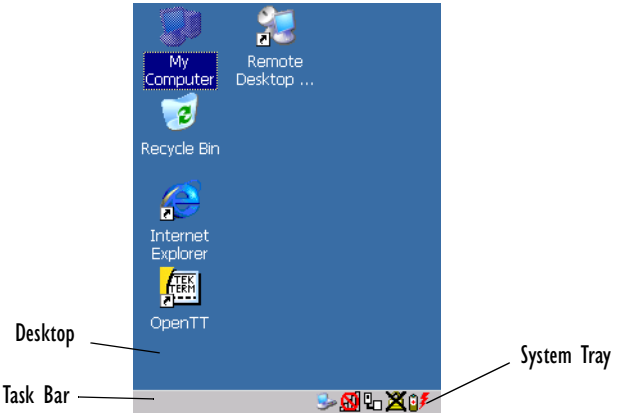
The second method of feedback is the display of popup messages when the main battery level drops below a certain limit or the battery life has been exceeded.

Security Monitoring

The system monitor thread is also responsible for the current security level on the terminal.

The terminal has three security levels: User, Teklogix, and Supervisor. The system monitor task monitors the security level and will display an icon in the system tray if the terminal is in the Teklogix or Supervisor level. Any application that needs to set or get the current security level should do it through a shell API that will be handled by the system monitor task.

3.3.2.2 The Desktop



The desktop provides the user with a starting point to access the terminal's file system (through a link to Windows Explorer), and configuration (through a link to the **Control Panel**).

The user may also put any applications or files in the `\Windows\desktop` folder and they will be displayed on the desktop. This gives the user quick and easy access to files and applications they might use frequently.

Important: *This folder resides in RAM, and its contents will be lost during a cold boot.*

The desktop window is also implicitly registered with the OS by naming itself 'DesktopExplorerWindow'. The OS uses it to hide applications. Because Windows CE does not support true minimization, any minimized windows are just placed behind the desktop.

The Taskbar

The taskbar is a window drawn across the bottom of the terminal's screen. The taskbar has its own thread, and runs its own window, the system tray window, and the task manager dialog box.

The taskbar registers itself with the OS. The OS sends the taskbar two kinds of special messages:

- application creation and destruction events.
- certain key presses and key sequences.

Application creation and destruction events can be used for displaying buttons on the taskbar for running applications.

Key presses and key sequences can be used by the shell for any purpose. The taskbar displays the Task Manager on receiving **Alt + Esc**, cycles running application windows on receiving **Alt** + **Tab**; and it displays the start menu on receiving a **Menu** (**Blue** + **0**) key press. This start menu can be used to access certain shell features.

The taskbar is also responsible for displaying the start menu when the **Menu** key combination is pressed.

The System Tray

The system tray is a window within the taskbar. It registers a callback with the OS. Once registered the OS will forward messages sent by applications to display notification icons (`Shell_NotifyIcon()`) to the system tray.

The system tray task processes these messages and draws the notification icons in the system tray window. The system tray also forwards any mouse or touch events on the icons back to the window that registered them. The system tray also displays the current time in its window when configured to do so.

The Task Manager

The task manager is a dialog box that is created on startup but is only displayed when the user requests it (by pressing **Blue** + **0**, then **T**, or by pressing **Alt** + **Esc**, or by selecting **Start Menu**, **Task Manager**). When it is displayed, it lists the currently running applications. It allows the user to start a new application, close a running application, or bring a running application to the foreground.

When attempting to close an application, the task manager sends it a close message. If the application does not close, the task manager checks to make sure they can close this application and ask the user if they really want to kill it. If the user answers yes, the task manager kills the application's process.

3.3.2.3 The User Interface

The desktop contains icons for shortcuts to the most commonly access files and folders. At the bottom of the desktop is the taskbar. On the right side of the taskbar is the system tray. The system tray window does not have an outline but is only as tall as the taskbar and as wide as the icons it is displaying. The taskbar and the system tray can be configured to display on any edge of the screen.

3.3.2.4 Navigation

The shell and the standard start menu are fully navigable using the keyboard. The following table outlines special keys and key combinations for the shell.

Operation	Key Or Key Combination
Navigation	Arrow pad
Open / Forward / Exit and save	**Enter**
Close / Exit and don't save	**Esc**
Back	**Bksp**
Focus Cycle (dialog boxes)	**Tab**
Select / Button press	**Space**
Start Menu	**Blue** + **0**
Task Manager	**Blue** + **0**, then **T**; **Alt** + **Esc**
Cycle Tasks	**Blue** + **0**, then **C**; **Alt** + **Tab**
Go to System Tray	**Blue** + **0**, then **Y**
Show Desktop	**Blue** + **0**, then **D**
Change security level	**Blue** + **0**, then **S**
Show power information	**Blue** + **0**, then **P**

The shell is fully navigable by touch, except there is no means of bringing up the start menu.

3.3.2.5 Colour Schemes

The shell uses system-defined colour types to display the desktop and the taskbar. The user can use the *Appearance* tab of the Display control-panel applet to adjust these colours. Applications can use the Windows system-colours API to change them.

3.3.2.6 Differences

The customized Psion Teklogix shell is an enhanced version of the Handheld PC (HPC) shell, which is similar to the shell on the desktop version of Windows. There are some modifications to account for differences between the typical HPC and the 7535's screen size and requirements. The major differences between the HPC shell and Psion Teklogix' shell on the 7535 are:

- The HPC shell is optimized for 480x240 pixel displays, while Psion Teklogix' shell is optimized for both 240x320 and 320x240 displays.
- The HPC shell has a 26-pixel taskbar, Psion Teklogix' shell reduces this to 18-pixels to maximize the desktop (work) area.
- Psion Teklogix' shell does not have a start button. Any important links should be on the desktop.
- Psion Teklogix' shell does not have tabs on the taskbar for the running applications.
- Psion Teklogix' shell uses the **Menu** key-combination (**Blue** + **0**) to display a start menu with shortcuts to frequently used features.

3.3.2.7 Error Messages

The shell uses the Windows CE standard error messaging system to display major errors and uses on screen message boxes to display runtime errors.

3.4 Power Management

The Power Manager acts as a mediator between devices, applications, and defined OS power states. It implements the following set of rules for facilitating communication between those three parties:

- OS power states impose maximum power consumption limits on all devices.
- Applications impose minimum power consumption limits on specific devices to obtain minimum performance levels.
- The Power Manager allows devices to intelligently manage their own power as long as they keep their power levels between the maximum and minimum limits.

- If the minimum power consumption limit is set higher than the maximum, the power of the device will remain elevated for as long as the application requires the device.
- If the OS transitions to a suspended power state, application-imposed minimum power limits will be set aside while the OS is suspended.

3.5 The Filesystem

The filesystem of the 7535 appears as one unified space. However it is composed of several different types of memory: internal RAM, internal flash, and installed memory cards.

When the 7535 cold-boots, the bootloader installs the operating system into RAM. The resulting filesystem—the `\Windows`, `\Program Files`, `\My Documents` directories and so on—resides in RAM, and is cleared during a cold boot.

Note: *In normal usage, the 7535 is not cold-booted. Unlike many computers, the unit is merely suspended when it is not in use, and the RAM retains its contents.*

The 7535's internal nonvolatile flash memory and any available memory cards are made available to this filesystem. That part of the 7535's internal flash memory available to the user appears as the `\Flash Disk` folder. Each partition on a memory card appears as a separate folder under the root folder. (Most memory cards have one partition by default; this can be changed through the Storage Manager.)

Memory-card folders are named as follows:.

Type Of Card	Name Of First Or Only Partition	Name of Second And Later Partitions
SD Card or MMC	`\SD-MMC Card`	`\SD-MMC Card2`, `\SD-MMC Card3`...
Compact Flash card	`\CF Card`	`\CF Card2`, `\CF Card3`...

3.6 Locations Of Applications

Applications may be located in several places in the 7535.

An application can be installed either to RAM or to flash memory. If the application is installed to RAM, it is completely lost when the unit is cold-booted.

The default directory for files installed through ActiveSync's Application Manager is `\Program Files\<appname>`, where `<appname>` is the name of the program. On the 7535, this directory resides in RAM and will be lost during a cold or warm boot.

The application may be installed into flash, but only if the application can be run from some folder other than the `\Windows` folder, which is not placed in the flash file system.

If the application is installed into the 7535's internal flash memory in the folder `\Flash Disk`, the application will remain in the 7535, even after a cold or warm boot.

Application executables placed in `\Flash Disk\Startup` will be automatically started when the operating system starts after a cold boot. This will not happen after a resume from suspend.

Applications may be placed as `.cab` files in `\Flash Disk\Startup`. When the 7535 cold-boots, it will automatically install any `.cab` files located in this folder.

Applications may also be placed in memory cards.

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4.1 Overview

This chapter provides connection information specific to the 7535, for connecting to the device through the following methods:

- USB serial link. See section 4.2 on page 46.
- Bluetooth short-range wireless link. See section 4.3 on page 48.

The ActiveSync software from Microsoft can be used to establish communication with the device, once the physical connection has been made.

Once an ActiveSync connection has been made over a USB serial link, ActiveSync can be used over a wireless connection such as Bluetooth. Software can then be deployed as described in the *Developers' Guide*.

4.1.1 Setting Up ActiveSync

ActiveSync allows you to connect the 7535 to a PC through USB or Bluetooth communication. File transfers, file synchronization and sending e-mail can all be done via ActiveSync.

Important: *ActiveSync **must** be connected and synchronized, and a 'Partnership' set up, through USB at least once before other connection types are possible.*

Install the most recent version of ActiveSync on your PC (check the Microsoft website for the latest software).

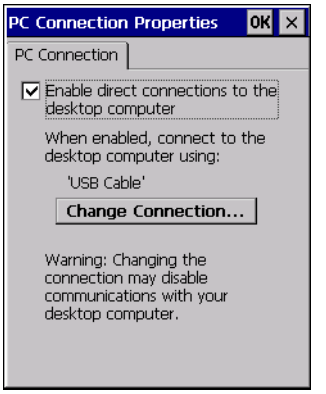
Connection Types

There are two types of connection provided for by ActiveSync:

- **Guest -** A guest connection allows file transfers. No synchronization is performed. If the 7535 is password protected, the password prompt will appear when connecting as guest.
- **Partnership -** A partnership connection allows for synchronization of files, e-mail and other data. If the 7535 is password protected, a password prompt will appear before allowing synchronization.

You can disconnect any ActiveSync connection by double-clicking on the blue icon in the 7535's system tray and selecting the **Disconnect** button from the dialog.

Double-click the **PC Connection** icon in the Control Panel. The PC Connection Properties dialog appears. Verify that the checkbox that allows connection to the desktop is checked:


PC Connection Properties
OK
PC Connection
Enable direct connections to the desktop computer
When enabled, connect to the desktop computer using:
'USB Cable'
Change Connection...
Warning: Changing the connection may disable communications with your desktop computer.

"Connect Using" specifies the port to be used for connecting to the PC:

- **USB** specifies using the USB Type-B (client) port of the 7535. This port is provided on the Portable Docking Module.
- **Bluetooth** specifies using the internal Bluetooth connection of the 7535 (if present). This connection may have a different name.

To change the connection type, click on the **Change Connection...** button and select the connection from the dropdown list.

4.2 USB Serial Connections

The USB architecture defines a "host" device that can communicate with up to 127 client devices through a serial connection. When the host device powers up, it queries the USB bus, identifying devices.

USB serial connections are available at a number of different data rates.

- "High speed" USB devices communicate at 480 Mb/s.
- "Full speed" USB devices communicate at 12 Mb/s.
- "Low speed" USB devices communicate at 1.5 Mb/s.

USB devices may be self-powered, or powered through the USB cable.

Any device that draws less than 100 mA from the USB cable is called a “low-powered” device; this includes self-powered devices that need no power, as well as devices such as tablets and mice that need little power.

Devices that draw more than 100 mA from the USB cable are called “high-powered” devices. The USB cable must be connected to another device that can supply this power.

The 7535’s Portable Docking Module is not rated to supply power to high-powered USB devices.

USB cables can have two types of connectors. The ‘type-A’ connectors, found on USB host devices such as desktop computers, are wide and flat. The ‘type-B’ connectors, found on peripherals, are narrower and squarer.

USB cable lengths are limited. Full-speed cables are a maximum of 5 m long.

To connect using ActiveSync via USB:

1. Connect the USB cable to the USB type-A port on your computer.
2. Connect the other end of the USB cable to the 7535’s USB type-B port. This port is the square connector on the *left* side of the Portable Docking Module (labelled with the symbol).

On the 7535...

3. Open the 7535’s Control Panel.
4. Double-click on the **PC Connection** icon. The PC Connection dialog opens.
5. Verify that the **Use Connection** checkbox is checked and that the unit will connect using USB.

On the development PC...

6. Double-click on the ActiveSync icon in the system tray. The ActiveSync menu appears.
7. Select **Connection Settings**. The *Connection Settings* dialog appears.
8. Place a checkmark in the checkbox labeled **Allow USB connection with this desktop computer**.

9. Press **OK**. The *Settings* dialog disappears.
10. Select **File**, **Get Connected**. The *Get Connected* wizard appears.
11. Press **Next**. ActiveSync searches for a connection.

On the 7535...

12. Select **Start**, **Programs**, **ActiveSync**, **direct**. A dialog appears, indicating that the 7535 is attempting to connect.
13. A successful connection is indicated by a blue icon in the 7535's system tray. The 7535 and the PC will also play sounds to indicate that they are connected, if sound is enabled on the devices.

4.3 Bluetooth Wireless Connections

Bluetooth wireless connections use a short-range wireless link to implement peer-to-peer "piconets" of up to seven devices.

Each device on the piconet is identified by a three-digit MAC. An individual device can be a member of more than one piconet. Different piconets are distinguished by different frequency-hopping codes. Bluetooth radios use FHSS in the unlicensed 2.4-GHz ISM band.

Bluetooth radios are divided into three power classes:

Power Class	Maximum Output Power
1	100 mW (20 dBm)
2	2.5 mW (4 dBm)
3	1 mW (0 dBm)

Table 4.1 Bluetooth Power Classes

Bluetooth connections can run at up to 740 kb/s, with a range of up to 10 metres for classes 2 and 3, and 100 metres for class 1.

To connect using Bluetooth, you will need:

- A 7535 with an internal Bluetooth card.
- A PC with Bluetooth and ActiveSync.

- An existing ActiveSync partnership between the 7535 and the PC. This partnership must be established through the USB connection.

To connect:

1. Select **Blue** + **0**. The *Start Menu* opens.
2. Select **Settings**. The *Control Panel* opens.
3. Double-click on the **Bluetooth Device Properties** icon. The *Bluetooth Manager* dialog opens.
4. Ensure that the development PC is powered on and that its Bluetooth radio is enabled.
5. Click on the **Scan Device** button and wait for the 7535 to complete its scan (approximately 20 seconds). Services offered by discovered devices, such as the PC, will be displayed in the list box. Each service of a device receives a separate entry:

   If the discovered device has been given a unique name by its owner, that name is used to identify it.

Note: *You can change the device-name and description of your 7535's radio by clicking on the* ***System*** *icon in* Control Panel*, which will open the* System Properties *page. Click on the* Device Name *tab to access the menu and change your settings. Then click on* ***OK****.*

Although the name will have changed in the Property *screen, the radio only reads it on boot-up. Therefore, for the changes to take effect, you must cold-boot or warm-boot the 7535.*

6. A discovered device may display several service profiles that it can use to communicate. Supported services that can be activated include: dial-up networking service, serial connection for printing, and LAN access using PPP.
7. Highlight the PC's service profile in the list, then double-click on it. A properties menu appears.
8. Select **Active** to make this service active.

9. Select **Trusted** to make this service trusted. A dialog appears asking whether authentication is needed.

10. If authentication is needed for the service, click **Yes**, then enter the PIN. When the 7535 tries to connect with a remote device that has Authentication enabled, you will be prompted to verify the PIN. The *Authentication Request* dialog will appear. Enter the **PIN**, press **OK**, and the devices will be connected.

11. Press **OK**. The *Bluetooth Manager* disappears, and the *Control Panel* reappears.

12. Double-click on the **PC Connection** icon. The *PC Connection Properties* dialog appears.

13. Press the **Change Connection** button. The *Change Connection* dialog appears.

14. Select Bluetooth from the dropdown list in the *Change Connection* dialog.

15. Press **OK**. The *Change Connection* dialog disappears, revealing the *PC Connection Properties* dialog.

16. Press **OK**. The *Control Panel* reappears.

On the PC...

17. Select **File**, **Connection Settings** in the ActiveSync window, or double-click on the ActiveSync icon in the system tray. The *ActiveSync* menu appears.

18. Select **Connection Settings**. The *Connection Settings* dialog appears.

19. Place a checkmark in the checkbox labeled **Allow serial cable or infrared connection to this COM port**.

20. Select the COM port assigned to the Bluetooth radio.

21. Press **OK**. The Settings dialog disappears.

22. Select **File**, **Get Connected**. The Get Connected wizard appears.

23. Press **Next**. ActiveSync searches for a connection.

On the 7535...

24. Click on the **Start** button, then **Programs**, then **ActiveSync**, and select **remote** from the ActiveSync submenu. A dialog appears, indicating that the 7535 is attempting to connect.

25. A successful connection is indicated by a blue icon in the 7535's system tray. The 7535 and the PC will also play sounds to indicate that they are connected, if sound is enabled on the devices.

REINSTALLING THE OS 5

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5.1 Overview

This section describes what you need to do to replace the operating system on your 7535.

The OS software image on a 7535 contains the Windows CE .NET operating system (OS), the .NET runtime engine, and all the software included with the 7535. It may also include Open TekTerm (Psion Teklogix' terminal emulator program), or the Jeode Java Virtual Machine (JVM).

OS images are available from Psion Teklogix in several slightly-different variants:

- with the .NET runtime engine (part number 1000891*x*)
- with the .NET runtime engine and TekTerm (part number 1000973*x*)
- with the .NET runtime engine and the Jeode JVM (part number 1000892*x*)

where *x* indicates the revision level, starting with A.

These variants may be distinguished as follows:

- The variant with TekTerm has the **TekTerm** icon on the desktop.
- The variant with the Java Virtual Machine has **Jeode EVM** in its *Programs* menu. (Press **Blue** + **0**, then select **Programs**, to reach this menu.)

A Windows registry key is set corresponding to these variants. The key

`HKEY_LOCAL_MACHINE\SOFTWARE\Teklogix\CurrentVersion\ImageContents`

is set to '`SDK Image`', '`TekTerm Image`' or '`Java Image`', depending on the variant.

On rare occasions, it may be necessary to replace the 7535's bootloader software or the software in its peripheral controller. Contact Psion Teklogix support for assistance (see Appendix A: Support Services And Worldwide Offices for details).

5.1.1 Displaying The Datecode Of The Operating System

There are a few ways to display the datecode of the operating-system software in the 7535. The version of this software is reported as a date code from the day the software was built. The date code of the software image can be found using any of the following methods:

- When running the TekTerm program, press **Ctrl** + **Alt** + **0** to show TekTerm's *Display Menu*. TekTerm displays the date code of the software.

- Enter the **Control Panel**, select the **System** icon, and open the **Properties** tab. The item for "WinCE Code" displays the datecode of the OS image.
- Hold down the 7535's **Scan**, **Blue** and **Enter** buttons for 6 seconds. The 7535 boots into its boot loader and displays the datecode of the OS image.

5.2 Serial Download

This section explains how to replace the operating-system software image on a 7535 through a serial cable.

5.2.1 Equipment Needed

Replacing the software image serially requires the following items:

- The new software image. The software image can be obtained from Psion Teklogix.
- A PC with an available serial connection.
- A 7535 Portable Docking Module (PDM), which has a serial port that connects to the 7535's console port.
- Serial communications software that can handle Y-modem file transfer.
- A serial cable. This cable, available as Psion Teklogix part number 9003659, has a 9-pin D-connector on both ends.

5.2.2 Upgrading The Software Image

The software image on a 7535 is upgraded by rebooting the device into the BooSt bootloader, copying the OS image file to the 7535, then rebooting the device. The 7535's boot loader loads and runs the new OS image file.

The new OS image file must be named `753xOS.img`.

The following steps explain the process for upgrading the OS software image in a 7535 using a serial connection and a Portable Docking Module:

On the 7535...

1. Press and hold the **Scan**, **Blue** and **Enter** buttons simultaneously for six seconds. The 7535 reboots to the BooSt bootloader and displays text similar to the following:

```
Psion Teklogix 7535 BooSt.
Copyright Psion Teklogix Inc. 2002, 2003
Starting BooSt...
Graphical console connected.
CPU (rev = 0x6) clock 400 MHz
Psion Teklogix 7535 rev B
NAND flash: 32 MB (Samsung K9F5616U0B), 15 MB reserved for OS
partition
RAM: 64 MB
BooSt version I173o (0x3F68A35F)
PCon version I193n
Keyboard version 3
Boot code image info: size = 235296
       BooSt OS for 753x
       Build version I173o
SDMMC: SD Card 4 bit data bus enabled
753xOS.img image info: size = 12601941
       753x Windows CE.NET
       K053r
BooSt key combo detected.
OS load skipped.
Touch calibration read from EEPROM successful
PDM connected to docking port
nand0-0 mounted: size = 16220160 (31680 * 512)

753x boot menu
--------------
1) Run main OS
!) Clean start main OS
2) Begin YMODEM load
3) Show configuration
4) Audio test
5) Display test
6) RAM test
7) Erase flash file system

Command>
```

2. Connect the 7535 to the development PC using the serial cable. One end of the serial cable plugs into the PC's serial port and the other end of the cable plugs into the serial port on the Portable Docking Module.

On the development PC...

3. Rename the OS software image from the part number under which it was provided (such as `1000932A1.img`) to `753xOS.img`.

4. Set the serial communications software for the port where the serial cable is connected. Use 8 data bits, no parity, one stop bit (8N1), a data rate of 115 200 bits per second, and no flow control.

5. Start the serial communications software.

6. Press **Enter**. The 7535 echoes a menu to the PC's screen through the communications software. This menu is also displayed on the 7535's own screen.

In the communications software on the PC, or on the 7535...

7. Press 2 to begin a Y-modem transfer. The 7535 displays:

```
Attempting YMODEM receive to BooSt loader...
CCCCCCCCCCC
```

On the PC...

8. Select the OS image file for serial transfer, using Y-modem protocol.

9. Start the download. The 7535 receives the image file and places it in its internal flash storage, then displays messages similar to the following:

```
YMODEM successfully received 0x115A880 bytes.
Load copy to nand0 info: size = 12601941
       753x Windows CE.NET
       K053r
Load completed successfully.
nand0-0 mounted: size = 15728640 (30720 * 512)
Command> load "/nand0-0/753xOS.img" run
Loading "/nand0-0/753xOS.img"...
Load RAM image info: size = 12601941
       753x Windows CE.NET
       K053r
Loading 9% complete...
Loading 29% complete...
Loading 48% complete...
Loading 68% complete...
Loading 92% complete...
Loading 100% complete...
Resetting to RAM module.
```

The 7535 automatically reboots copies the newly-loaded operating system to RAM, then runs it.

Note: *You may need to reconfigure any changes done to the system configuration through the Control Panel. The registry will be set to default values if the new OS determines that the previously-existing registry values are not compatible.*

5.3 USB Download

This section explains how to replace the operating-system software image in a 7535 through a USB cable.

5.3.1 Equipment Needed

Replacing the software image requires the following items:

- The new software image. The software image can be obtained from Psion Teklogix. It has the part number 1000428x (where x is the version).
- A PC with an available USB Type-A connection
- A 7535 Portable Docking Module (PDM), with a USB Type-B port.
- A USB A/B cable.

5.3.2 Upgrading The Software Image

The software image on a 7535 is upgraded by rebooting the device into the BooSt boot loader, copying the OS image file to the 7535, then rebooting the device. The 7535's boot loader loads and runs the new OS image file.

When the 7535 is booted into BooSt and connected to a PC using a USB cable, a drive labeled "Removable Disk" appears on the PC. This drive contains the 7535 software image. To upgrade the software image simply copy the new software image (which must be named `753xos.img`) to this drive.

Important: *Before connecting a 7535 to your PC using USB, you must update the USB .inf file on your PC. This can be done by running the USB Setup program included on the SDK CD.*

The USB Setup program, with part number 1000997x, can also be downloaded from the Psion Teklogix developers' web site at http://www.psionteklogix.com/developers/ .

The following steps explain the process for upgrading the software image in a 7535 connected through USB using a Portable Docking Module:

1. Hold down the **Scan**, **Blue** and **Enter** buttons simultaneously for 6 seconds. The 7535 reboots to the BooSt bootloader and displays text similar to the following:

```
Psion Teklogix 753x BooSt.
Copyright Psion Teklogix Inc. 2002, 2003
Starting BooSt...
Graphical console connected.
CPU (rev = 0x5) clock 400 MHz
Psion Teklogix 7535 rev B
NAND flash: 32 MB (Samsung K9F5616U0B), 15 MB reserved for OS
partition
RAM: 64 MB
BooSt version I173o (0x3F68A35F)
PCon version I193n
Keyboard version 3
Boot code image info: size = 235296
       BooSt OS for 753x
       Build version I173o
SDMMC: SD Card 4 bit data bus enabled
753xOS.img image info: size = 12601941
       753x Windows CE.NET
       K053r
BooSt key combo detected.
OS load skipped.
Nothing connected to tether port
PDM connected to docking port
nand0-0 mounted: size = 16220160 (31680 * 512)

753x boot menu
--------------
1) Run main OS
!) Clean start main OS
2) Begin YMODEM load
3) Show configuration
4) Audio test
5) Display test
6) Touch test
7) RAM test

Command>
```

2. Connect the 7535 to your PC using the USB cable.

The A end of the USB cable plugs into your PC and the smaller square B end of the cable plugs into the portable docking module connected to the 7535. When the USB connection is established, a new drive appears on your PC named “Removable Disk”.

The 7535 displays the following line on the console:

```
nand0-0 removed

Command>
```

That part of the 7535’s flash memory which stores the operating-system image and is normally accessible only by the bootloader has been dismounted and made available to the bootloader’s USB driver.

The regular bootloader commands (**1** and **!**) to load and run the main operating system will not work, and will give an error that there is no operating-system image available.

3. Rename the Software Image from the part number under which it was provided (such as `1000428A1.img`) to `753xOS.img`.

4. Copy the file `753xOS.img` to the “Removable Disk” drive on your PC.

5. ‘Stop’ the Removable Disk drive.

   Once the file copy has finished, the Removable Disk must be ‘stopped’ to properly save the new file. To do this, select the **Unplug or Eject Hardware** icon in the system tray in the bottom right corner of your PC, or use the **Add/Remove Hardware** option in the **Control Panel** (follow the options to “Uninstall/Unplug a device”, and then “Unplug/Eject a device”, then select the Mass Storage Device).

Important: *If the Removable Disk is not stopped, the 7535 image could become corrupt causing the terminal not to boot properly.*

If this happens, you must boot the 7535 into BooSt, connect it to your PC with the USB cable, and format the Removable Disk (right click on the drive and select the Format option).

Once the Removable Disk has been properly stopped on the PC, the BooSt Console displays a message similar to the following:

```
nand0-0 mounted: size = 16220160 (31680 * 512)

>
```

The flash memory containing the operating-system image has been disconnected from the development computer and is now accessible by the bootloader. The regular bootloader commands (**1** and **!**) to load and run the main operating system now work.

6. Reboot the 7535 by selecting option **1**, "Run Main OS", from the boot-loader menu. The device boots into the new operating system.

Note: *You may need to reconfigure any changes done to the system configuration through the Control Panel. The registry will be set to default values if the new OS determines that the previously-existing registry values are not compatible.*

APPENDIX A

SUPPORT SERVICES AND WORLDWIDE OFFICES

Psion Teklogix provides a complete range of product support services to its customers worldwide. These services include technical support and product repairs.

A.1 Technical Support

Technical Support for Mobile Computing Products is provided via e-mail through the Partner Program website. To reach the website, go to *www.psionteklogix.com* and click on the Partner Program link, which takes you to the Partner Program page. Then click on the **Log-in** button or the **Register** button, depending on whether you have previously registered for Teknet or the Partner Program. (Your UserID and password are the same for TekNet and the Partner Program.)

A.2 Product Repairs

International

For product repairs, please contact your local Psion Teklogix office (see page A-2).

Canada/U.S.A

Canadian and U.S. customers can receive access to repair services, by calling the toll-free number below, or via our secure website.

Note: *Customers calling the toll-free number should have their Psion Teklogix customer number or trouble ticket number available.*

Voice: 1 800 387-8898 (press option “2”)

Fax: 1 905 812-6304

Web Site: http://service.psionteklogix.com

A.3 WorldWide Offices

Company Headquarters And Canadian Service Centre

Psion Teklogix Inc.
2100 Meadowvale Boulevard
Mississauga
Ontario
Canada L5N 7J9
Tel: +1 905 813 9900
Fax: +1 905 812 6300
E-mail: salescdn@psion.com

North American Headquarters And U.S. Service Centre

Psion Teklogix Corp.
1810 Airport Exchange Boulevard
Suite 500
Erlanger, Kentucky
USA 41018
Tel: +1 859 371 6006
Fax: +1 859 371 6422
E-mail: salesusa@psion.com

International Subsidiaries

Psion Teklogix GmbH
Jakob Kaiser Straße 3
D-47877 Willich Münchheide
Deutschland
Tel: +49 2154 9282 0
Fax: +49 2154 9282 59
E-mail: info@teklogix.de

Psion Teklogix Danmark
Vesterballevej 4-6
7000 Fredericia
Danmark
Tel: +45 76 24 0133
Fax: +45 75 94 4679
E-mail: tedk@psion.com

Psion Teklogix S.A.
La Duranne
135 Rue Rene Descartes
BP 421000
13591 Aix-En-Provence
Cedex 3; France
Tel: +33 4 42 90 88 09
Fax: +33 4 42 90 88 88
E-mail: tekeuro@psion.com

Psion Teklogix AB
Stora Badhusgatan 18-20
411 21 Göthenburg, Sweden
Tel: +46 31 13 15 50
Fax: +46 31 13 57 80
E-mail: info@teklogix.se

Psion Teklogix (UK) Ltd.
Bourne End Business Centre
Cores End Road
Bourne End
Buckinghamshire SL8 5AR, England
Tel: +44 1628 648800
Fax: +44 1628 648810
WWW: www.teklogix.co.uk
E-mail: tekuk@psion.com

Psion Teklogix Finland
Metsänneidonkuja 8
02130 Espoo
Finland
Tel: +358 9 4307 8390
Fax: +358 9 4307 8395
E-mail: tekeuro@psion.com

Psion Teklogix Italia S.r.l
Via Galilei, 47
20092 Cinisello Balsamo
Milan, Italy
Tel: +39 2 6604 5410
Fax: +39 2 6604 5412
E-mail: tkxitalia@psion.com

Psion Asia Pacific Pte. Ltd.
210 South Bridge Road
#03-01 Singapore 058759
Tel: +65 673 58108
Fax: +65 673 35990
E-mail: teksing@teklogix.com

Psion Teklogix de Mexico, S.A. de C.V.
Sierra Mojada 626, 2º Piso
Col. Lomas Barrilaco, C.P. 11010
Mexico, D.F., Mexico
Tel.: +5255 5 202 6802/6950
Fax: +5255 5 202 4505
E-mail: salesusa@psion.com

Psion Teklogix Benelux
Nieuwe weg 1,
2070 Zwijndrecht
Belgium
Tel: +32 3 250 22 00
Fax: +32 3 250 22 20
E-mail: info@psionteklogix.be

Psion Teklogix España, S.L.
Cityparc Ronda de Dalt
Ctra. Hospitalet 147-149
Edificio Atenas 2° 3ª
08940 Cornellà de Llobregat (Barcelona)
España
Tel: +34 9 3475 0220
Fax: +34 9 3475 0230
E-mail: teklogix@apdo.com

Psion Teklogix B.V.
Venrayseweg 57,
5928 NZ Venlo
Nederlands
Tel: +31 77 32400 44
Fax: +31 77 32400 53

Psion Teklogix Africa
Postnet Suite 39, Private Bag x11
Halfwayhouse, 1685 Ground Floor East
Waterfall Edge Phase 2, Waterfall Park
Bekker Road MIDRAND 1685
South Africa
Tel: +27 11 805 7440/1/2
Fax: +27 11 805 7444

Psion Teklogix Wireless Technologies (Shanghai) Ltd.
Unit 1507-08
Mingshen Building
No.3131 Kai Xuan Rd
Shanghai 200030
China
Tel: +86 21 5407 1991
Fax: +86 21 5407 1992

Psion Teklogix Systems India Pvt. Ltd.
M-74, 1st Floor, "M" Block Market
Greater Kailash-II
New Delhi - 110048
India
Tel: +91 11 26219257
Fax: +91 11 26219076
E-mail: tekind@psion.com

Psion Teklogix Taiwan Co., Ltd.
15FL-5, No. 366 Boai 2nd Road,
Tzuo Ying District, KAOHSIUNG 813
Taiwan, R.O.C.
Tel: +886 7 558 2028
Fax: +886 7 558 3328
E-mail: jerry.chen@teklogix.com

A.4 WORLD WIDE WEB

www.psionteklogix.com

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